Someone On My Level: How Women of Color Describe the Role of Teaching Assistants in Creating Inclusive Technology Courses

Emergent Research Forum (ERF)

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Abstract

Women of color are grossly underrepresented in technology-related degree programs. This underrepresentation is often attributed to exclusionary environments traditionally characteristic of introductory technology courses. Studies indicate teaching assistants (TAs) may play an important role in mitigating factors and creating inclusive learning environments for underrepresented populations. We propose a study to explore the role undergraduate TAs play in creating inclusive environments for women of color in technology-related classes. We will use feminist approaches to give voice to and illuminate women of color’s experiences with introductory technology classes and their TAs.

Keywords

women of color, information technology education, teaching assistants, feminist methodology

Introduction

Women of color make up less than 10% of the technology industry out of only 26% of all women in the field (Ashcraft, McLain, & Eger 2016). This dismal representation is problematic for the industry to be able to meet the demand for high-skilled industry workers (Annabi & Lebovitz 2018). It is estimated that by 2024, only 41% of all computing-related jobs can be filled by U.S. degree recipients (Ashcraft et al. 2016). If the IT industry is able to capitalize on the entirety of the U.S. population, not only will it be better able to meet workforce demand, but also benefit from a diversity of perspectives that improve innovation, team performance, market representation, and financial achievement (Annabi & Lebovitz 2018; Ong, Wright, Espinosa, & Orfield 2011). Furthermore, and perhaps more importantly, improving women of color’s representation in such an impactful industry is an issue of social equity, signaling empowerment of their status in society (Annabi & Lebovitz 2018).

To begin addressing women of color’s underrepresentation in the technology industry, it is imperative that we investigate their low participation in post-secondary technology-related degrees (Barker, McDowell, & Kalahar 2009; Kendricks, Nedunuri, & Arment 2013; Syed, Goza, Chemers, & Zurbriggen 2012; Varma 2006; Wilson et al. 2012). As of 2012, women of color only received 4.8% of computer science bachelor’s degrees, compared to 31.3% in all fields (Ashcraft et al. 2016; Catalyst 2017). Research suggests women of color are interested in technology courses, but only if they foster a meaningful learning culture, not dependent on competitive or isolating ideals (Varma 2006). Studies also indicate that peer mentors and teaching assistants (TAs) play an important role in creating inclusive learning environments for underrepresented populations (Barker et al. 2009; Kendricks et al. 2013; Syed et al. 2012). However, there is limited research exploring the role TAs play specifically in women of color’s experiences in technology courses. Furthermore, the literature largely presents viewpoints of university administrators, instructors, or TAs, rather than women of color’s perspectives (Reges 2003; Syed et al. 2012).

We propose a study to explore the role undergraduate TAs play in improving the participation of women of color in technology-related degrees. We will use interpretive, exploratory focus groups and interviews to
explain how women of color describe the role of TAs in their introductory technology courses. In our study, we utilize feminist methodologies that provide further opportunities to develop an understanding of and inclusive factors based in women of color’s perspectives. Our objective is to improve training of future undergraduate TAs in order to utilize their unique positioning to improve the experiences for women of color in post-secondary technology-related programs.

Literature Review

Technology-related fields have long explored underserved identities in post-secondary education, and the literature is clear that they face structural barriers (e.g., fragmented support programs, poor pedagogical practices) and social barriers (e.g., gender and racial role socialization, malicious peer interactions) (Barker et al. 2009; Kendricks et al. 2013; McGee & Bentley 2017; Syed et al. 2012; Varma 2006; Wilson et al. 2012). Due to limited space, in this review we focus on literature addressing major and inclusive factors affecting women of color’s participation in technology courses and how peer mentors and TAs affect that experience.

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Table 1. Exclusive and inclusive factors for women of color in technology courses

Exclusive Factors for Women of Color in Introductory Technology Courses

The literature suggests introductory technology courses create barriers due to their size, competitive environments, and lack of collaboration opportunities. These courses are often large lecture classrooms that overwhelm students and often foster competitive environments by discouraging collaboration (A. C. Johnson 2007; Barker et al. 2009; D. R. Johnson 2007; Reges 2003). This is further illustrated by often white and male condescending dominant voices in the classroom, attempting to demonstrate advanced knowledge in course topics rather than asking questions or clarifying issues (A. C. Johnson 2007; Eddy & Brownell 2016). This mix of factors results in women of color sharing a common sentiment of being the only ones confused in the class (A. C. Johnson 2007; Ong et al. 2011).

Women of color already feel that they do not belong on college campuses (D. R. Johnson 2007). They often have encouraging pre-college academic environments, supported by peers, instructors, and family (A. C. Johnson 2006; Ong et al. 2011). Furthermore, women of color from lower-income districts often lack exposure to technology in schools (A. C. Johnson 2007; McGee & Bentley 2017; Trauth, Cain, Joshi, Kvasny, & Booth 2016; Varma 2006). Therefore, when TAs and professors make offhand comments on how course content “should be easy,” this further adds to isolation and legitimacy threat (A. C. Johnson 2007; D. R. Johnson 2007; Espinosa 2011; Ong et al. 2011; Varma 2006). As women of color often desire their academic work to be applied to social issues and their communities, these exclusive factors do not fit their paradigms of what values should be laden in technology courses (A. C. Johnson 2007).

Inclusive Factors for Women of Color in Introductory Technology Courses

Prior literature has indicated that opportunities for peer interaction can lead to higher levels of inclusion for women of color (D. R. Johnson 2007; Espinosa 2011; Ong et al. 2011). Positive perceptions of student
interaction within a course or department was the most important factor in predicting student’s intentions to continue in the major after the introductory course, and women of color who persisted in technology and other STEM disciplines reported frequent collaboration with peers (Barker et al. 2009; D. R. Johnson 2007; Espinosa 2011; Ong et al. 2011). Clubs and other major-related organizations showed an improvement of retention for women of color more so than white women, implying peer relationships are especially important (Espinosa 2011; Wilson et al. 2012). Institutions with investment in student resources also have shown higher retention rates for women of color in technology-related fields (Espinosa 2011). For example, participation in undergraduate research increased women of color’s persistence in STEM degrees by 12% (Espinosa 2011). These opportunities develop a sense of belonging to the field because they increase a women of color’s exposure to various types of work, instill confidence in their ability as practitioners, and provide positive role models and peer relationships (Espinosa 2011).

TAs often improve understanding of course knowledge in smaller sections they lead, and through one-on-one assistance (Reges 2003; Varma 2006). Women of color and other underrepresented students in introductory programming courses rated TAs as more important to their learning than non-underrepresented students, regarding availability, encouragement, and help received (Barker et al. 2009). Studies suggest that peer mentoring, a role undergraduate TAs often play, mitigate barriers women of color face in technology courses (Barker et al. 2009; Varma 2006; Wilson et al. 2012). Preszler (2009) found that workshops led by peer mentors showed higher rates of student engagement and exam scores (Preszler 2009). While these workshops similarly benefitted male and female students, they had higher impact on underrepresented students’ grades. Mentors also help with underrepresented students’ integration into academia and increase a sense of belonging (Syed et al. 2012; Wilson et al. 2012).

**Methodology**

We propose an exploratory, interpretive study grounded in feminist methodology, which expands on traditional qualitative approaches to critically scrutinize power dynamics, meaning making, and contextual influence for richer data collection. Feminist approaches to our focus group and interview techniques develop an in-depth understanding of participants’ perspectives on the role TAs play in introducing or mitigating factors presented in the literature. We transfer power to participants by allowing them to steer conversation, pose questions, and increase complexity of discussion by challenging each other’s, or even the researcher’s, perspectives (Jowett & O’Toole 2006; Wilkinson 1998). In our focus groups, we will also observe how meaning is co-constructed. Furthermore, in interviews we will also be creating a space for participants to speak for uninterrupted long periods of time, which allows for analysis on not only content, but in how a participant is telling the story (Hesse-Biber 2012).

Our participants are women of color in three different technology programs at a U.S. research public university in the northwest. Participants were recruited through listservs sent to all non-Caucasian identifying individuals who had taken the introductory course in the major. These courses utilize undergraduate TAs who grade assignments, host office hours, and lead weekly small class sessions separate from a larger lecture. Most importantly, these TAs hold a unique position compared to instructors as they have taken the same introductory course they are teaching, are enrolled in the department the course is hosted in, and are typically only a year or two older than students. Our questions intend to elicit women of color’s experiences in relation to exclusive and inclusive factors in technology courses (see Table 1). We will use Miles and Huberman’s (1994) Interactive Model of content analysis to analyze focus group and interview data using deductive and inductive techniques (Miles and Huberman 1994). The initial content analysis framework is based on the main exclusive and inclusive factors summarized in Table 1, and further developed based on themes that emerge. Intercoder reliability will be based on inter-coder agreement.

**Preliminary Results**

In this section, we report on initial findings from three interviews with undergraduate women of color in an introductory technology course. Preliminary results suggest participants experience a mix of exclusive and inclusive factors presented in Table 1, as well as three new inclusive factors: holistic course content, relatable undergraduate TAs, and TAs as mentors.
Emphasized Exclusive Factors

Participants emphasized competitive environments as a major exclusive factor. Participant 1 discussed how her peers compare grades rather than discuss course content: “No one ever talks about the topics! [...] It’s like a competition to them, like that's the only thing that's brought up. It's not necessarily, ‘did you learn anything?’ it’s a ‘what’s your grade?’” Additionally, participant 1 elaborated on the issue of condescending dominant voices, and often spoke up in class only because she found “those who are actively participating are annoying and take time away from the lecture information itself.”

Participant 2 further discussed that the lack of similar identities added to her feeling of isolation: “Like honestly all these tech fields, related fields, [at our university] are predominantly white. I don’t feel comfortable. I can’t talk how I want to talk just because I feel like other people will look at me like, ‘gosh she’s ratchet.’ [...] Like ‘am I being too loud for you?’” Participant 2 also discussed feeling tokenization and legitimacy threat: “these other students look at me like ‘oh my gosh she’s like a token.’” However, Participant 2 did not question her internal sense of validity because of her encouraging pre-college academic environment: “It’s not because I think my ideas are not valid which I’m like ‘well, yes they are and you should listen to everybody.’ I’m used to group work just because where I went to school was a project based learning school [...] and everybody’s ideas should be heard but I don’t speak out as much as I would have when I went to high school.”

New and Emphasized Inclusive Factors

The first new factor emerged when Participant 1 discussed holistic course content: “I feel like [this class] gives a more comprehensive review whereas like [my other class] is straight programming, like you don’t get to learn much outside of that.” She supported these statements by discussing how class assignments emphasized opportunities for collaboration with peers: “you’re encouraged to talk to people cause [the course] assignments are super unique and it just fosters relationships.” Participant 1 also expanded on how the course content provides opportunities directly mitigating her previous experience with competitive environments: “like when you come to [this course] there are so many people that are welcoming that it just kind of counterbalances it and you just like, shift out of the peripherals.”

The second new factor that emerged was from participants describing relatable undergraduate TAs as a significant positive influence, especially because of their shared experiences in the same intended major. Participant 1 stated that her TA makes the major “more personable than I feel like a grad student would as he is currently going through the hurdles of the program.” She continued the distinction between undergraduates and graduate TAs by stating that, “if they were a grad student I feel like it would be harder for them to relate to the circumstances.” However, Participant 3 was the only one to see her TA as a peer. She defined a peer as “someone who is on my level and can relate to me.” Participant 3 also remarked that she trusted her TA more because he was an undergraduate.

Most significantly, the third new factor was that Participant 3 perceived her TA as a mentor, and saw his role as connecting her to the major’s community and encouraging her journey: “[he’s] a great mentor to me this quarter, giving me lots of advice about the major and internships... I truly feel that he believes in me, and it’s encouraging as I apply for the major.” In this case, undergraduate TAs were one of the most encouraging factors to continue in the major, even with exclusive barriers present in the course.

Conclusion and Future Work

The literature is clear on the challenges facing women of color in technology courses. Our preliminary results emphasized the important role undergraduate TAs play in creating inclusive and welcoming environments for women of color. Our research will further explore the experiences of women of color in depicting exclusive and inclusive factors. We will host several focus groups and interviews for a larger sample of women of color across three different technology-related programs, which each utilize undergraduate TAs. When collecting data, we will pay specific attention to how individual differences affect women of color’s experience in technology courses and in describing roles of TAs. Our preliminary results indicate that some of the exclusive factors may be experienced and addressed differently by individual women due to differences in backgrounds (e.g., Participant 2 being able to address isolation due to her

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supportive high school environment). We will elaborate on the salience of these sentiments using Trauth’s (2002) Individual Differences of Theory in Gender and IT (Trauth 2002).

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